Citrix CloudPlatform (powered by Apache CloudStack) Version 4.5 Installation Guide

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Citrix CloudPlatform

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If you you want to learn about installing CloudPlatform, read this document.

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About this Guide

1.1. About the Audience for this Guide

This guide is meant for anyone responsible for installing CloudPlatform such as cloud administrators and Information Technology (IT) administrators.

1.2. Using the Product Documentation

The following guides provide information about CloudPlatform:

- *Citrix CloudPlatform (powered by Apache CloudStack) Installation Guide*
- *Citrix CloudPlatform (powered by Apache CloudStack) Concepts Guide*
- *Citrix CloudPlatform (powered by Apache CloudStack) Getting Started Guide*
- *Citrix CloudPlatform (powered by Apache CloudStack) Administration Guide*
- *Citrix CloudPlatform (powered by Apache CloudStack) Hypervisor Configuration Guide*
- *Citrix CloudPlatform (powered by Apache CloudStack) Developer's Guide*

For complete information on any known limitations or issues in this release, see the *Citrix CloudPlatform (powered by Apache CloudStack) Release Notes*.

For information about the Application Programming Interfaces (APIs) that is used in this product, see the API documents that are available with CloudPlatform.

1.3. Experimental Features

CloudPlatform product releases include some experimental features for customers to test and experiment with in non-production environments, and share any feedback with Citrix. For any issues with these experimental features, customers can open a support ticket but Citrix cannot commit to debugging or providing fixes for them.

The following experimental featues are inluded in this release:

- Advanced Networking in Baremetal
- Linux Containers
- Supported Management Server OS and Supported Hypervisors: RHEL7/CentOS 7 for experimental use with Linux Containers

1.4. Additional Information and Help

Information on accessing Citrix Knowledge Center and about contacting technical support.

1.5. Contacting Support

The support team is available to help customers plan and execute their installations. To contact the support team, log in to the support portal at *support.citrix.com/cloudsupport*[1] by using the account credentials you received when you purchased your support contract.

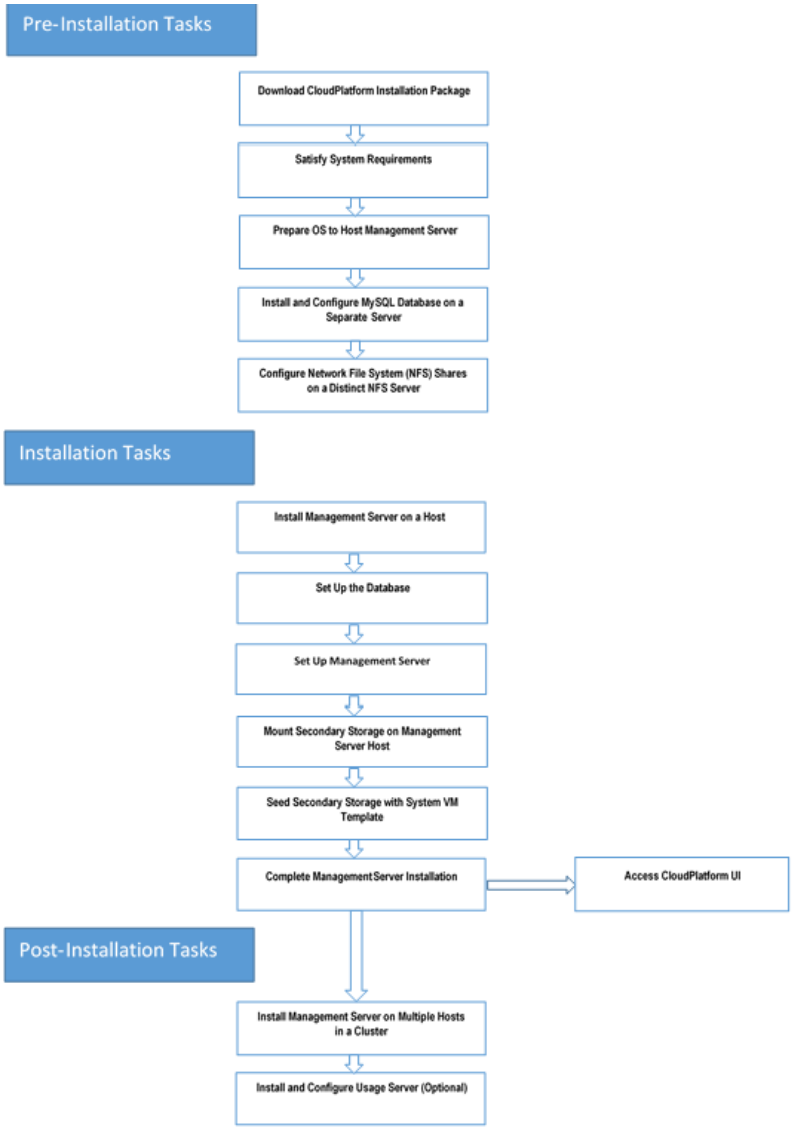
[1] http://support.citrix.com/cloudsupport

Planning for Your CloudPlatform Installation

This chapter explains how you can plan for the successful installation of CloudPlatform in your environment.

2.1. CloudPlatform Installation Task Flow

The following chart displays the tasks that you must complete to install CloudPlatform successfully. Each box in the chart represents a task or a bunch of associated tasks that you must perform. The arrows indicate the sequence in which you must perform these tasks.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Prepare OS to Host Management Server
Install and Configure MySQL Database on a Separate Server
Configure Network File System (NFS) Shares on a Distinct NFS Server
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Set Up the Database
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Mount Secondary Storage on Management Server Host
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Install Management Server on Multiple Hosts in a Cluster
Install and Configure Usage Server (Optional)

System Requirements

This chapter describes the requirements for installing CloudPlatform Management Server.

3.1. Operating System Requirements

Following are the minimum Operating System requirements for installing CloudPlatform.

Preferred Operating Systems:

- RHEL versions 6.3, 6.4, 6.5, and 7 (64-bit)
- CentOS versions 6.3, 6.4, 6.5, and 7 (64-bit)

Note

RHEL 7 and CentOS 7 are supported only for experimental use with Linux Containers (LXC) hypervisor.

Citrix recommends you to purchase a RHEL support license. Citrix support will not be helpful in resolving issues with the underlying RHEL operating system.

3.2. Hardware Requirements

Following are the minimum hardware requirements for installing CloudPlatform:

- CPU - 64-bit X86 CPU
- Memory - 4 GB
- Hard Disk - 50 GB of local disk. Citrix recommends to use 500 GB when secondary storage is on the same machine with Management Server.

3.3. Web Browser Requirements

The Web browsers that the CloudPlatform Web UI supports are:

- Mozilla Firefox versions 26 to 33
- Google Chrome 38.x
- Apple Safari 7.1
- Microsoft Internet Explorer versions 9, 10 and 11

3.4. Network Requirements

Following are the minimum network requirements for installing CloudPlatform. This section describes the ports, protocol, firewall considerations, and so on, required for installing CloudPlatform

- One NIC card with static IP address.
- Fully-qualified domain name for the machine where you want to install the Management Server software.

- Default user file-creation mode mask (umask). The value is 022.

  If the value is not 022, several files might not be accessible to the cloud user, which would result in installation failure.

- Red Hat Network Account - Enable SELinux on the RHEL Operating System.

3.5. Ports that CloudPlatform Uses

This section lists the ports that CloudPlatform and its entities use for communication.

Management Server

The following ports are opened on Management Server:

Port	Function
8080	Default port for CloudPlatform web server.
8096	Port for the user or client to communicate with Management Server (unauthenticated).
9090	Port for the communication among Management Servers in a cluster.
8250	Port for the agents (hypervisor agents such as KVM agent, Secondary Storage VM (SSVM), and Console Proxy VM (CPVM)) to communicate with Management Server.

MySQL Database Server

The following port is opened on MySQL database server:

Port	Function
3306	Helps Management Server communicate with MySQL database server.

System VMs

The following port is opened on System VMs (virtual router, Secondary storage VM (SSVM), and (CPVM)):

Port	Function
3922	Helps Management Server communicate with system VMs.

Secondary Storage

The following port is opened on secondary storage:

Port	Function
111/2049	Helps Management Server communicate with secondary storage.

Preinstallation Tasks

4.1. Preparing the Operating System to Host the Management Server

You must do the following tasks:

- *Section 4.1.1, “Downloading CloudPlatform Installation Package ”*
- *Section 4.1.2, “Verifying the Fully-Qualified Host Name ”*
- *Section 4.1.3, “Setting the Value of SELinux Variable ”*
- *Section 4.1.4, “Verifying Connectivity ”*
- *Section 4.1.5, “Configuring a Local yum Repository ”*
- *Section 4.1.6, “Configuring User Process Limits ”*
- *Section 4.1.7, “Enabling NTP for Synchronizing Time ”*
- *Section 4.1.8, “Installing and Configuring the Database”*
- *Section 4.1.9, “Configuring Network File System (NFS) Shares ”*

4.1.1. Downloading CloudPlatform Installation Package

This section describes how you can download the CloudPlatform version 4.5 installation package to the system where you want to install Management Server.

1. Access the Citrix - Downloads website at *https://www.citrix.com/English/ss/downloads/*

   Note

   To download the installation packages, you must need an active My Citrix account.

2. On the left-side of the Citrix - Downloads website, under **Find Downloads**, select CloudPlatform as the product and click **Find**.
3. On the **CloudPlatform** page, expand **CloudPlatform 4.5** and navigate to the **CloudPlatform 4.5** page to view the installation package information.
4. Identify the CloudPlatform 4.5 installation package that you want to download and click **Download** on the right side.
5. In the **Download Agreement** page, select **I have read and certify that I comply with the above Export Control Laws** and click **Accept**.
6. In the **Citrix Download Manager** page, click **Download Now**.

A file with a name similar to *CloudStack-VERSION-NOSVERSION.tar.gz* will be downloaded to your computer.

Section 5.1, “Install the Management Server on the First Host ”

4.1.2. Verifying the Fully-Qualified Host Name

To verify the Fully-Qualified Host Name of the host where you install Management server, do the following:

1. Log-in to the operating system of the host using the root privileges.
2. Run the following command to verify the fully-qualified host name:

```
# hostname --fqdn
```

This must return a fully qualified host name. For example, managament1.lab.example.org. If the command fail to elicit an appropriate result, you must verify whether the **`/etc/hosts`** file contains the fully-qualified host name.

4.1.3. Setting the Value of SELinux Variable

Security-Enhanced Linux (SELinux), the Linux kernel security module, enables CloudPlatform to support access control security policies. If you are using RHEL operating system, you must verify whether SELinux is configured on your operating system. Then, you can set the value of SELinux variable to "permissive".

1. Log on to the operating system of the host using the root privileges.
2. Check to see whether SELinux is installed on your machine. In RHEL, SELinux is installed and enabled by default. Run the following command to verify this:

```
# rpm -qa | grep selinux
```

3. Using vi editor, edit the /etc/selinux/config file and set the value of the SELINUX variable to “permissive”. This ensures that the permissive setting will be maintained after a system reboot.

```
# vi /etc/selinux/config
```

4. Run the following command to set the value of SELinux to permissive and make it effective immediately, without requiring a system reboot.

```
# setenforce 0
```

4.1.4. Verifying Connectivity

To ensure that the computer where you want to install management server can connect to the Internet, do the following:

1. Log-in to the operating system of the host using the root privileges.
2. Use the **`ping`** command to verify connectivity. For example, you can ping www.citrix.com.

```
# ping  www.citrix.com
```

4.1.5. Configuring a Local yum Repository

If you do not have a Red Hat Network account, you need to configure a local Yum repository.

1. Log on to the operating system of the host using the root privileges.
2. If you are working with a physical host, insert the RHEL installation CD. If you are using a VM, attach the RHEL ISO.
3. Mount the CDROM to /media.
4. Create a repo file at **`/etc/yum.repos.d/rhel6.repo`**. In this repo file, insert the following lines:

```
[rhel]
name=rhel6
baseurl=file:///media
enabled=1
gpgcheck=0
```

Note

If you are using RHEL 7 and you do not have a Red Hat Network account, register it online from the Red Hat site. Then, run the following:

```
# subscription-manager register --username <username> --password <password> --auto-
attach
# subscription-manager repos --enable=rhel-7-server-rpms
# subscription-manager repos --enable=rhel-7-server-optional-rpms
```

4.1.6. Configuring User Process Limits

For smoother functioning, it's recommended to increase the maximum user process limit on RHEL 6 platforms. The default value is 1024. To modify the value, perform the following:

1. Log in to the operating system of the host as a cloud user.
2. Modify the following:

```
# /etc/security/limits.d/90-nproc.conf
```

To increase the value to 2048, run the following:

```
# cloud soft nproc 2048
```

Note

You must perform this configuration and set the **nproc** value to 2048 to ensure the uninterupted collection of usage statistics and log rotation.

3. Log out.

   A reboot is not required for this to take effect; however, the user must be logged out.

4. To check whether the value has been updated, run the following as the cloud user:

```
# ulimit -u
```

4.1.7. Enabling NTP for Synchronizing Time

NTP is required to synchronize the clocks of the servers in your cloud. To enable NTP on the host, do the following:

1. Run the following command to install NTP:

```
# yum install ntp
```

2. Using vi editor, edit the NTP configuration file to point to your NTP server.

```
# vi /etc/ntp.conf
```

   In the NTP configuration file, add one or more servers with the names of the NTP servers you want to use.

   For example:

   server 0.xenserver.pool.ntp.org

   server 1.xenserver.pool.ntp.org

   server 2.xenserver.pool.ntp.org

   server 3.xenserver.pool.ntp.org

3. Run the command to restart the NTP client.

```
# service ntpd restart
```

4. Make sure NTP will start again upon reboot.

```
# chkconfig ntpd on
```

4.1.8. Installing and Configuring the Database

CloudPlatform uses a MySQL database server to store its data. Usually in an enterprise environment, the CloudPlatform Management Server is installed on multiple nodes and the MySQL database is installed on a separate node.

The following procedure explains how to install and configure MySQL database on a separate node.

4.1.8.1. Installing and Configuring MySQL Database on a Standalone Server

This section describes how to install MySQL on a standalone node, separate from the Management Server. This configuration is intended for a deployment that includes several Management Server nodes.

1. Check the version of MySQL that you have installed.
   - For RHEL 6.x, you must install MySQL version 5.1.73 or higher.

     If you have installed any previous versions of MySQL, do the following before you proceed:

     a. Uninstall the MySQL version that is earlier than 5.1.73.

     b. Log on as root user to your database node and run the following commands. If you are going to install a replica database, then log-in to the master.

     ```
     # yum install mysql-server
     # chkconfig --level 35 mysqld on
     ```

   - For RHEL 7.0, you must install MySQL version 5.6.21.
2. Edit the MySQL configuration and insert the following lines in the [mysqld] section.

   Location of [mysqld] section is */etc/my.cnf* or */etc/mysql/my.cnf*, depending on your OS.

   You can place these lines below the datadir line. The max_connections parameter should be set to 350 multiplied by the number of Management Servers you are deploying. This example assumes two Management Servers.

   ```
   innodb_rollback_on_timeout=1
   innodb_lock_wait_timeout=600
   max_connections=700
   log-bin=mysql-bin
   binlog-format = 'ROW'
   expire_logs_days=10
   max_binlog_size=100M
   skip-name-resolve
   ```

Note

If you are not using the database replication, you can use the **expire_logs_days** and the **max_binlog_size** parameters to truncate the MySQL binary logs. The **expire_logs_days** parameter defines the number of days to store the binary log files. The **max_binlog_size** parameter defines the maximum size of each bin log file.

The binlog-format variable is supported in MySQL versions 5.1 and greater. It is not supported in MySQL 5.0. In some versions of MySQL, an underscore character is used in place of the hyphen in the variable name. For the exact syntax and spelling of each variable, consult the documentation for your version of MySQL.

3. Start the MySQL service, then invoke MySQL as the root user.

```
# service mysqld start
# mysql -u root
```

4. MySQL does not set a root password by default. It is very strongly recommended that you set a root password as a security precaution. Run the following command, and substitute your own desired root password for <password>. You can answer "Y" to all questions except "Disallow root login remotely?". Remote root login is required to set up the databases.

```
mysql> SET PASSWORD = PASSWORD('password');
```

From now on, start MySQL with **mysql -p** so it will prompt you for the password.

5. To grant access privileges to remote users, perform the following steps.

   a. Run the following command from the mysql prompt, then exit MySQL:

   ```
   mysql> GRANT ALL PRIVILEGES ON *.* TO ‘root@%’ WITH GRANT OPTION;
   mysql> exit
   ```

   b. Restart the MySQL service.

   ```
   # service mysqld restart
   ```

   c. Open the MySQL server port (3306) in the firewall to allow remote clients to connect.

   ```
   # iptables -I INPUT -p tcp --dport 3306 -j ACCEPT
   ```

   d. Edit the /etc/sysconfig/iptables file and add the following lines at the beginning of the INPUT chain.

   ```
   -A INPUT -p tcp --dport 3306 -j ACCEPT
   ```

After you install Management Server on the first node, you must configure the database client on the same node. For more information, see steps *4* and *5* of *Section 5.1, “Install the Management Server on the First Host ”*

4.1.8.2. Security Consideration for MySQL

Ensure that you change the default passwords for all accounts after the MySQL installation by running mysql_secure_installation. For more information, see *mysql_secure_installation — Improve MySQL Installation Security*[1].

4.1.9. Configuring Network File System (NFS) Shares

NFS Shares On a Distinct Node:

This section describes how to set up Network File System (NFS) shares for secondary and (optionally) primary storage on an NFS server running on a separate node from the Management Server node.

The exact commands for the following steps may vary depending on the version of the operating system that you use.

Warning

(KVM only) Ensure that no volume is already mounted at your NFS mount point.

1. On the storage server, create an NFS share for secondary storage. If you are using NFS for primary storage, create a second NFS share. For example:

```
# mkdir -p /export/primary
# mkdir -p /export/secondary
```

2. To configure the new directories as NFS exports, edit /etc/exports. Export the NFS share(s) with rw,async,no_root_squash. For example:

```
# vi /etc/exports
```

   Insert the following line.

```
/export  *(rw,async,no_root_squash)
```

3. Export the /export directory.

```
# exportfs -a
```

4. To mount the secondary storage on your Management Server, continue with the steps *5* and *6* of *Section 5.1, “Install the Management Server on the First Host ”*. Then, restart the Management Server host.

[1] http://dev.mysql.com/doc/refman/5.7/en/mysql-secure-installation.html

Two NFS shares called /export/primary and /export/secondary are now set up.

If you want to configure the NFS shares for primary and secondary storage on the Management Server node, do with the following steps:

1. Edit the /etc/sysconfig/nfs file.

```
# vi /etc/sysconfig/nfs
```

Uncomment the following lines:

```
LOCKD_TCPPORT=32803
LOCKD_UDPPORT=32769
MOUNTD_PORT=892
RQUOTAD_PORT=875
STATD_PORT=662
STATD_OUTGOING_PORT=2020
```

2. Edit the /etc/sysconfig/iptables file.

```
# vi /etc/sysconfig/iptables
```

Add the following lines at the beginning of the INPUT chain:

```
-A INPUT -m state --state NEW -p udp --dport 111 -j ACCEPT
-A INPUT -m state --state NEW -p tcp --dport 111 -j ACCEPT
-A INPUT -m state --state NEW -p tcp --dport 2049 -j ACCEPT
-A INPUT -m state --state NEW -p tcp --dport 32803 -j ACCEPT
-A INPUT -m state --state NEW -p udp --dport 32769 -j ACCEPT
-A INPUT -m state --state NEW -p tcp --dport 892 -j ACCEPT
-A INPUT -m state --state NEW -p udp --dport 892 -j ACCEPT
-A INPUT -m state --state NEW -p tcp --dport 875 -j ACCEPT
-A INPUT -m state --state NEW -p udp --dport 875 -j ACCEPT
-A INPUT -m state --state NEW -p tcp --dport 662 -j ACCEPT
-A INPUT -m state --state NEW -p udp --dport 662 -j ACCEPT
```

3. Run the following commands:

```
# service iptables restart
# service iptables save
```

4. If NFS v4 communication is used between client and server, add your domain to /etc/idmapd.conf on both the hypervisor host and Management Server.

```
# vi /etc/idmapd.conf
```

Remove the character # from the beginning of the Domain line in idmapd.conf and replace the value in the file with your own domain. In the example below, the domain is company.com.

```
Domain = company.com
```

5. Restart the Management Server host.

Continue with *Section 5.2, “Prepare the System VM Template ”*

Installing CloudPlatform Management Server

5.1. Install the Management Server on the First Host

The first step in installation, whether you are installing the Management Server on one host or many, is to install the software on a single node.

Note

If you are planning to install the Management Server on multiple nodes for high availability, do not proceed to the additional nodes yet. You can do this configuration later.

1. Log-in to the operating system of the host using the root privileges.
2. Untar the CloudPlatform installation file that you downloaded to your computer and run the **`install.sh`** script that is available in it.

   For more information on how to download the CloudPlatform installation file, see *Section 4.1.1, "Downloading CloudPlatform Installation Package "*.

   Also, you can rename the following file and directory names with those you are using:

   ```
   # tar xzf CloudPlatform-VERSION-N-OSVERSION.tar.gz
   # cd CloudPlatform-VERSION-N-OSVERSION
   # ./install.sh
   ```

   You will see a few messages as the installer prepares, followed by a list of choices.
3. Choose **`M`** to install the Management Server software.

   ```
   > M
   ```

   Note

   If you want to install MySQL database on the Management Server host, you can choose the **`D`** option to do so. Then, you can run the **`./install.sh`** script again and choose the **`M`** option to install the Management Server software.

   After the successful installation of Management Server, a message like “Complete! Done,” is displayed.
4. **To configure MySQL database client** that you installed on a separate node, run the following command to create the cloud user on the database.

For more information on installing MySQL database on a separate node, see *Section 4.1.8.1, "Installing and Configuring MySQL Database on a Standalone Server "*

- **dbpassword** - Specify the password to be assigned to the cloud user. You can choose to provide no password.
- **dbhost** - Provide the hostname or IP address of the database node.

Note

This argument will not be available if you have configured MySQL database on the same node where you have installed CloudPlatform Management Server.

- **deploy-as** - Specify the user name and password of the user deploying the database. For example, if you originally installed MySQL with user "root" and password "password", provide **--deploy-as=root:password**.
- (Optional) **encryption_type** - Use file or web to indicate the technique used to pass in the database encryption password. Default: file.
- (Optional) **management_server_key** - Substitute the default key that is used to encrypt confidential parameters in the CloudPlatform properties file. Default: password. Citrix recommends you to replace this with a more secure value.
- (Optional) **database_key** - Substitute the default key that is used to encrypt confidential parameters in the CloudPlatform database. Default: password. Citrix recommends you to replace this with a more secure value.

```
# cloudstack-setup-databases cloud:<dbpassword>@<dbhost> --deploy-as=root:<password> -e
 <encryption_type> -m <management_server_key> -k <database_key>
```

5. Run a script that sets up iptables, rules, and SELinux for use by Management Server. This script will also chkconfig off and start Management Server.

```
# cloudstack-setup-management
```

6. **To mount the secondary storage on your Management Server**, first you create a mount point for secondary storage. For example:

```
# mkdir -p /mnt/secondary
```

For more information on configuring NFS shares, see *Section 4.1.9, "Configuring Network File System (NFS) Shares "*

7. Mount the secondary storage on your Management Server. Replace the example NFS server name and NFS share paths below with your own.

```
# mount -t nfs nfsservername:/nfs/share/secondary /mnt/secondary
```

5.2. Prepare the System VM Template

Secondary storage must be seeded with a template that is used for CloudPlatform system VMs.

Note

When copying and pasting a command, make sure that you have pasted the command as a single line. Some document viewers may introduce unwanted line breaks in copied text.

1. On the Management Server, run one or more of the following **`cloud-install-sys-tmplt`** commands to retrieve and decompress the system VM template. Run the command for each hypervisor type that you expect end users to run in this Zone.

2. If your secondary storage mount point is not named /mnt/secondary, substitute your own mount point name.

   If you set the CloudPlatform database encryption type to "web" when you set up the database, you must now add the parameter -s <management-server-secret-key>.

   This process will require approximately 5 GB of free space on the local file system and up to 30 minutes each time it runs.

   For more information on latest SystemVM templates, see *Appendix A, Latest System VM Templates*

   - For XenServer:

     ```
     # /usr/share/cloudstack-common/scripts/storage/secondary/cloud-install-
     sys-tmplt -m /mnt/secondary -u http://download.cloud.com/templates/4.5/
     systemvm64template-2014-12-18-4.5.0.0-xen.vhd.bz2 -h xenserver -s <optional-management-
     server-secret-key> -F
     ```

   - For KVM:

     ```
     # /usr/share/cloudstack-common/scripts/storage/secondary/cloud-install-
     sys-tmplt -m /mnt/secondary -u http://download.cloud.com/templates/4.5/
     systemvm64template-2014-12-18-4.5.0.0-kvm.qcow2.bz2 -h kvm -s <optional-management-
     server-secret-key> -F
     ```

   - For vSphere:

     ```
     # /usr/share/cloudstack-common/scripts/storage/secondary/cloud-install-
     sys-tmplt -m /mnt/secondary -u http://download.cloud.com/templates/4.5/
     systemvm64template-2014-12-18-4.5.0.0-vmware.ova -h vmware -s <optional-management-
     server-secret-key>  -F
     ```

Note

CloudPlatform fails to create system VMs if you have provisioned your cloud infrastructure on VMWare hypervisor. This occurs on each zone in your environment that is provisioned on VMWare hypervisor.

This failure logs the following error message:

```
Message: Unable to unpack snapshot OVA file at: /var/cloudstack/mnt/
VM/7407677735140.6646923a/template/tmpl/1/8//routing-8.ova
```

To avoid this failure, you must manually run the following command on the templates folder after you register the new VMWare system VM template.

```
chmod -R 0777 /path_to_secondary_storage_mount_point/template/
```

- For Hyper-V

```
# /usr/share/cloudstack-common/scripts/storage/secondary/cloud-install-
sys-tmplt -m /mnt/secondary -u http://download.cloud.com/templates/4.5/
systemvm64template-2014-12-18-4.5.0.0-hyperv.vhd.bz2 -h hyperv -s <optional-management-
server-secret-key> -F
```

- For LXC:

```
/usr/share/cloudstack-common/scripts/storage/secondary/cloud-install-
sys-tmplt -m /mnt/secondary -u http://download.cloud.com/templates/4.5/
systemvm64template-2014-12-18-4.5.0.0-kvm.qcow2.bz2 -h lxc -s <optional-management-
server-secret-key> -F
```

3. If you are using a separate NFS server, perform this step.

Warning

If you are using the Management Server as the NFS server, you need not perform this step. Also you can skip the mounting, and directly run the command.

When the script has finished, unmount secondary storage and remove the created directory.

```
# umount /mnt/secondary
# rmdir /mnt/secondary
```

4. Repeat these steps for each secondary storage server.

5.3. Security Considerations for Management Server

We recommend you to strictly follow the security instructions given in the following sections.

5.3.1. Enabling HTTPS for CloudPlatform Management Server

CloudPlatform Management Server runs on Tomcat, and by default the web interface is accessed over HTTP on 8080/TCP. You can enable HTTPS on Tomcat to provide secure communication to the CloudPlatform Management Server. If you enable HTTPS, the Management Server web interface will be securely available at <https://yourserver:10285/client>, or optionally at <https://yourserver/client>.

1. Back up **`/etc/cloudstack/management/server.xml`**.
2. Edit **`/etc/cloudstack/management/server.xml`**.

   Consider the following:

   - By default the HTTPS configuration is commented out, so uncomment it and update it as necessary.
   - Ensure that the keystore file will need appropriate permissions.
   - Include the password you will use for the certificate.
   - Use an unprivileged port (1025/TCP or above) because Tomcat runs as the "cloud" user and not root.

     The following is the default code snippet under service catalina, which is commented out. You can uncomment it and use port 8443 or change it to an unprivileged port, 1025/TCP or above.

```
<Connector port="8443" protocol="HTTP/1.1" SSLEnabled="true"
maxThreads="150" scheme="https" secure="true"
clientAuth="false" sslProtocols="TLSv1,TLSv1.1,TLSv1.2"
keystoreType="PKCS12"
keystoreFile="conf/cloud-localhost.pk12"
keystorePass="password"/>
```

Note

To enable HTTPS on Tomcat for providing secure communication to the CloudPlatform Management Server, use TLS protocol versions 1.0, 1.1, or 1.2.

Ensure that the parameter name for tomcat versions prior to 6.0.38 is **`sslProtocols`**. For version 6.0.38 and higher, the parameter name is **`sslEnabledProtocols`**.

3. Obtain the certificate:

   a. Follow your organization's standard procedures to generate and obtain a certificate suitable for securing a website. For example, generate a private key:

```
# openssl genrsa 1024 > cloud.key
```

b. Generate a certificate signing request (CSR) with appropriate values:

```
# openssl req -new -key cloud.key > cloud.csr
```

To know more about generating Private Key and Certificate Signing Request (CSR) for an existing Java keystore and import certificate signed by external SSL authority on CloudPlatform management service, see *http://support.citrix.com/article/CTX136431*

c. Submit the CSR to a certificate authority (for example, DigiNotar) and get the certificate, or generate a self-signed certificate as follows:

```
# openssl x509 -req -in cloud.csr -signkey cloud.key > cloud.crt
```

To know more about generating self-signed SSL certificate and configure CloudPlatform management service to use this certificate, see *http://support.citrix.com/article/CTX136351*

4. Generate Keystore:

a. Create a PKCS12 format keystore by using the private key and signed certificate:

```
# openssl pkcs12 -export -in cloud.crt -inkey cloud.key -name cloud -passout
 pass:password > /usr/share/cloudstack/management/conf/cloud-localhost.pk12
```

5. Restart CloudPlatform

a. Once the Tomcat configuration is updated and the keystore is in place, restart CloudPlatform:

```
# service cloud-management restart
```

b. Verify that Tomcat is listening on the configured port (10285/TCP in this example):

```
# netstat -plnt | grep 10285
```

c. If it is not working, check **`/var/log/cloudstack/management/catalina.out`** for error messages.

6. Configure iptables:

a. If iptables is in use, update the rules to allow access to the configured port. For example:

```
# iptables -I INPUT 1 -p tcp -m tcp --dport 10285 -j ACCEPT
```

b. Verify connectivity to <https://yourserver:10285/client>.

c. Optionally, enable redirection from 443/TCP in iptables:

```
# iptables -t nat -A PREROUTING -i eth0 -p tcp --dport 443 -j REDIRECT --to-port
 10285
```

d. Verify connectivity to <https://yourserver/client>.

e. Once iptables is configured correctly, save the changes:

```
# service iptables save
```

5.3.2. Configuring SSL Ciphers for Management Servers

Citrix recommend you to use ciphers with size higher than 128 bits for CloudPlatform Management Server. Do not use weak ciphers such as RC4. For the ease of making these configuration changes, a new configuration file, **`/etc/cloudstack/management/java.security.ciphers`**, has been introduced. In this file, make the following change:

```
jdk.tls.disabledAlgorithms=DH keySize < 128, RSA keySize < 128, DES keySize
< 128, SHA1 keySize < 128, MD5 keySize < 128, RC4
```

This file name has been set in the *JAVA_OPTS* which overrides or appends the values from **`/etc/cloudstack/management/java.security.ciphers`** to **`$JRE_HOME/lib/security/java.security`**. This operation is performed when you start the Management Server.

Therefore, before starting the Management Server, ensure that the *`security.overridePropertiesFile`* parameter is in **`$JRE_HOME/lib/security/java.security`** is set to true. It implies that the values can be overriden in **`java.security`** file.

5.4. Logging on to CloudPlatform Web UI

After the successful installation of CloudPlatform in your environment, you can do the following:

- You can run the Web UI and log-in to the UI. This will help you understand CloudPlatform offerings and the way you will interact with CloudPlatform on an ongoing basis.

  Chapter 6, Logging on to the Management Server Web UI

- You can add the cloud infrastructure and try running some virtual machines on it. This will help you watch how CloudPlatform manages the infrastructure.

  For more information, refer to *CloudPlatform (powered by Apache CloudStack) Version 4.5 Getting Started Guide*.

Logging on to the Management Server Web UI

CloudPlatform Management Server provides a web-based UI that can be used by both administrators and end users. The appropriate version of the UI is displayed depending on the credentials used to log on.

The URL to log on to CloudPlatform is: (substitute your own management server IP address)

```
http://<management-server-ip-address>:8080/client
```

When you log on to CloudPlatform UI for the first time, a guided tour splash screen appears. On later visits, you can specify the following to proceed to your Dashboard:

User name

The user name of your account. The default user name is **`admin`**.

Password

The password associated with the user name. The password for the default user name is **`password`**.

Domain

If you are a root user, leave this field blank.

If you are a user belongs to the sub-domains, enter the full path to the domain, excluding the root domain.

For example, suppose multiple levels are created under the root domain, such as Comp1/hr. The users in the Comp1 domain should enter Comp1 in the Domain field, whereas the users in the Comp1/sales domain should enter Comp1/sales.

Configuring Cluster Management Server Set Up

You can install the Management Server software on multiple hosts. Also, you can configure MySQL database on multiple nodes and use them with the cluster of Management servers that you have configured. You can, then, use a load-balancer to provide a virtual IP for each Management Server and balance the load across these Management Servers.

7.1. Installing Additional CloudPlatform Management Servers

On each additional host that you want to designate as Management Server, you must do the following:

- Install the Management Server software
- Configure the MySQL database client

  In this case, you must not use the argument **`--deploy-as`**.
- Set up the OS for Management Server

For more information, see *Section 5.1, “Install the Management Server on the First Host ”*

After you perform these tasks, you can seed secondary storage with a template that is used for CloudPlatform system VMs. For more information, see *Appendix A, Latest System VM Templates*

7.1.1. Management Server Load Balancing

CloudPlatform can use a load balancer to provide a virtual IP for multiple Management Servers. The administrator is responsible for creating the load balancer rules for the Management Servers. The application requires persistence or stickiness across multiple sessions. The following chart lists the ports that should be load balanced and whether or not persistence is required.

Even if persistence is not required, enabling it is permitted.

Source Port	Destination Port	Protocol	Persistence Required?
80 or 443	8080 (or 20400 with AJP)	HTTP (or AJP)	Yes
8250	8250	TCP	Yes
8096	8096	HTTP	No

In addition to the above settings, the administrator is responsible for setting the 'host' global configuration value from the management server IP to load balancer virtual IP address. If the 'host' value is not set to the VIP for Port 8250 and one of your management servers crashes, the UI is still available but the system VMs will not be able to contact the management server.

7.2. Replicating Database (Optional)

CloudPlatform supports database replication from one MySQL node to another. This is achieved using standard MySQL replication. You may want to do this as insurance against MySQL server or storage

loss. MySQL replication is implemented using a master/slave model. The master is the node that the Management Servers are configured to use. The slave is a standby node that receives all write operations from the master and applies them to a local, redundant copy of the database. The following steps are a guide to implementing MySQL replication.

Note

Creating a replica is not a backup solution. You should develop a backup procedure for the MySQL data that is distinct from replication.

1. Ensure that this is a fresh install with no data in the master.
2. Edit my.cnf on the master and add the following in the [mysqld] section below datadir.

   ```
   log_bin=mysql-bin
   server_id=1
   ```

   The server_id must be unique with respect to other servers. The recommended way to achieve this is to give the master an ID of 1 and each slave a sequential number greater than 1, so that the servers are numbered 1, 2, 3, etc.
3. Restart the MySQL service:

   ```
   # service mysqld restart
   ```
4. Create a replication account on the master and give it privileges. We will use the "cloud-repl" user with the password "password". This assumes that master and slave run on the 172.16.1.0/24 network.

   ```
   # mysql -u root
   mysql> create user 'cloud-repl'@'172.16.1.%' identified by 'password';
   mysql> grant replication slave on *.* TO 'cloud-repl'@'172.16.1.%';
   mysql> flush privileges;
   mysql> flush tables with read lock;
   ```
5. Leave the current MySQL session running.
6. In a new shell start a second MySQL session.
7. Retrieve the current position of the database.

   ```
   # mysql -u root
   mysql> show master status;
   +------------------+----------+--------------+------------------+
   | File             | Position | Binlog_Do_DB | Binlog_Ignore_DB |
   +------------------+----------+--------------+------------------+
   | mysql-bin.000001 |      412 |              |                  |
   +------------------+----------+--------------+------------------+
   ```

8. Note the file and the position that are returned by your instance.
9. Exit from this session.
10. Complete the master setup. Returning to your first session on the master, release the locks and exit MySQL.

```
mysql> unlock tables;
```

11. Install and configure the slave. On the slave server, run the following commands.

```
# yum install mysql-server
# chkconfig mysqld on
```

12. Edit my.cnf and add the following lines in the [mysqld] section below datadir.

```
server_id=2
innodb_rollback_on_timeout=1
innodb_lock_wait_timeout=600
```

13. Restart MySQL.

```
# service mysqld restart
```

14. Instruct the slave to connect to and replicate from the master. Replace the IP address, password, log file, and position with the values you have used in the previous steps.

```
mysql> change master to
    -> master_host='172.16.1.217',
    -> master_user='cloud-repl',
    -> master_password='password',
    -> master_log_file='mysql-bin.000001',
    -> master_log_pos=412;
```

15. Then start replication on the slave.

```
mysql> start slave;
```

16. Optionally, open port 3306 on the slave as was done on the master earlier.

    This is not required for replication to work. But if you choose not to do this, you will need to do it when failover to the replica occurs.

7.2.1. Failover

This will provide for a replicated database that can be used to implement manual failover for the Management Servers. CloudPlatform failover from one MySQL instance to another is performed by the administrator. In the event of a database failure you should:

1. Stop the Management Servers (via service cloudstack-management stop).
2. Change the replica's configuration to be a master and restart it.
3. Ensure that the replica's port 3306 is open to the Management Servers.
4. Make a change so that the Management Server uses the new database. The simplest process here is to put the IP address of the new database server into each Management Server's /etc/cloudstack/management/db.properties.
5. Restart the Management Servers:

```
# service cloudstack-management start
```

Installing the Usage Server (Optional)

You can optionally install the Usage Server once the Management Server is configured properly. The Usage Server takes data from the events in the system and enables usage-based billing for accounts.

When multiple Management Servers are present, the Usage Server may be installed on any number of them. The Usage Servers will coordinate usage processing. A site that is concerned about availability should install Usage Servers on at least two Management Servers.

8.1. Requirements for Installing the Usage Server

- The Management Server must be running when the Usage Server is installed.
- The Usage Server must be installed on the same server as a Management Server.

8.2. Steps to Install the Usage Server

1. Run ./install.sh.

   ```
   # ./install.sh
   ```

   You should see a few messages as the installer prepares, followed by a list of choices.

2. Choose "S" to install the Usage Server.

   ```
   > S
   ```

3. Once installed, start the Usage Server with the following command.

   ```
   # service cloudstack-usage start
   ```

The Administration Guide discusses further configuration of the Usage Server.

Upgrading CloudPlatform to the Latest Version

The following sections describe the procedures for updating from the previous versions to the latest version of CloudPlatform.

9.1. Upgrading from 4.3.x to 4.5.0

This section explains how to upgrade from CloudPlatform version 4.3.x to version 4.5.

Note

CloudPlatform fails to create system VMs if you have provisioned your cloud infrastructure on VMWare hypervisor. This occurs on each zone in your environment that is provisioned on VMWare hypervisor.

This failure logs the following error message:

```
Message: Unable to unpack snapshot OVA file at: /var/cloudstack/mnt/
VM/7407677735140.6646923a/template/tmpl/1/8//routing-8.ova
```

To avoid this failure, you must manually run the following command on the templates folder after you register the new VMWare system VM template.

```
chmod -R 0777 /path_to_secondary_storage_mount_point/template/
```

Pre-Upgrade Procedure

1. Register the latest System VM templates.

   For more information about the latest, hypervisor-specific system VM templates, refer to *Appendix A, Latest System VM Templates*

2. Download the latest System VM to all the primary storages using the **`prepareTemplate`** API.

   ```
   http://<management_server_ip_address>:8080/client/api?
   command=prepareTemplate&templateid=a8813ba3-dfe8-48b2-a583-0cb19c9423b2&zoneid=ce9a82ba-
   f419-4041-b72b-1d2ee1483ba5&response=json&sessionkey=G8yD3LXsOi1p5KVSkAO62VXM%2BGE%3D
   ```

   API response:

   ```
   { "preparetemplateresponse" : { "count":1 ,"template" : [
   {"id":"a8813ba3-dfe8-48b2-a583-0cb19c9423b2","name":"systemvm-
   vmware-4.5","displaytext":"systemvm-
   vmware-4.5","ispublic":false,"created":"2015-01-06T14:13:19-0800","isready":true,
    "passwordenabled":false,"format":"OVA","isfeatured":false,"crossZones":false,
    "ostypeid":"1a7f544c-95e0-11e4-b6cc-ced18bec4952","ostypename": "Debian
    GNU/Linux 7(64-bit)","account":"admin","zoneid":"ce9a82ba-f419-4041-
   b72b-1d2ee1483ba5","zonename":"zone-1","status":"Download Complete","size":2621440000,
    "templatetype":"USER","hypervisor":"VMware","domain":"ROOT",
   ```

```
 "domainid":"1a240d26-95e0-11e4-b6cc-
ced18bec4952","isextractable":false,"checksum":"01cb382894c35eab54a0b0d00a884931","tags":
[], "sshkeyenabled":false,"isdynamicallyscalable":false}] } }
```

3. (KVM on RHEL 6.0/6.1/6.2 only) If the existing CloudPlatform deployment includes one or more clusters of KVM hosts that run on RHEL 6.0, RHEL 6.1, or RHEL 6.2 operating system, you must first upgrade the operating system version of these hosts to RHEL 6.3.

   To do this task, see *Section 9.4, “Upgrading Operating System version of KVM Hosts to RHEL 6.3 from RHEL 6.0 or 6.1 ”*

4. Run the following command on all active Usage Server hosts to stop the Usage servers that are currently enabled.

```
# service cloudstack-usage stop
```

5. Run the following command on all Management Servers to stop the Management Server hosts.

```
# service cloudstack-management stop
```

6. Back up MySQL databases at the MySQL master.

   It is assumed in the following procedures that you have set the root password on the MySQL database as per the CloudPlatform best practices recommendation. In the following commands, substitute your own MySQL root password.

```
# mysqldump -u root -p<mysql_password> cloud > cloud-backup.dmp
# mysqldump -u root -p<mysql_password> cloud_usage > cloud-usage-backup.dmp
```

Upgrade Procedure

1. Access *https://www.citrix.com/downloads/cloudplatform.html* and download CloudPlatform 4.5 onto the new management server host.

   Note

   You need a valid Citrix account to access this link and download CloudPlatform 4.5.

2. You will get a file with the file name in the format **`CloudPlatform-4.5.0-N-OSVERSION.tar.gz`**. Untar the file and run the **`install.sh`** script that is available with it.

   Before you run the following command, you must replace the file and the directory names with the ones that you are using.

```
# tar xzf CloudPlatform-4.5.0-N-OSVERSION.tar.gz
# cd CloudPlatform-4.5.0-N-OSVERSION
# ./install.sh
```

   You can see a few messages as the installer prepares, followed by a list of options from which you can choose the option to perform the upgrade operation.

3. Enter **U** to upgrade the package.

```
>U
```

   You can view messages as the upgrade proceeds. After the upgrade is completed, you can view the message like **Complete! Done**.

4. If you have made changes to your existing copy of the **db.properties** and the **server.xml** configuration files in your previous-version of CloudPlatform installation, CloudPlatform preserves those changes in the upgrade. However, you need to do the following steps to place these changes in a new version of the file, which is compatible with version 4.5:

   If the upgrade output in the previous step includes a message like the following, it indicates that your old **db.properties** and **server.xml** files contain some custom content and you need to merge the two files:

   For **db.properties** file, the message appears as follows:

```
warning: /etc/cloud.rpmsave/management/db.properties created as /etc/cloudstack/
management/db.properties.rpmnew
```

   For **server.xml** file, the message appears as follows:

```
warning: /etc/cloud.rpmsave/management/server.xml created as /etc/cloudstack/management/
server.xml.rpmnew
```

   a. Backup the previous version of the **db.properties** or the **server.xml** file. For example: (substitute the file name in these commands as needed)

      For the **db.properties** file:

```
# mv /etc/cloudstack/management/db.properties /etc/cloudstack/management/
db.propertiesbackup
```

      For the **server.xml** file:

```
# mv /etc/cloudstack/management/server.xml /etc/cloudstack/management/
server.xmlbackup
```

   b. Copy the ***.rpmsave** file to create a new file.

      For the **db.properties** file:

```
# cp -ap /etc/cloudstack/management/db.properties.rpmsave /etc/cloudstack/management/
db.properties
```

      For the **server.xml** file:

```
# cp -ap /etc/cloudstack/management/server.xml.rpmsave /etc/cloudstack/management/
server.xml
```

   c. Merge your changes from the backup file into the new file.

      For the **db.properties** file:

```
# vi /etc/cloudstack/management/db.properties
```

For the **`server.xml`** file:

```
# vi /etc/cloudstack/management/server.xml
```

5. Repeat steps 1 - 6 on each management server node.

Post-Upgrade Procedure

1. If you are using VMWare or Hyper-V hypervisors, you must update **`SystemVM.ISO`**. *Section 9.15, "Updating SystemVM.ISO "*

2. Start the first Management Server.

```
# service cloudstack-management start
```

Wait until the databases are upgraded. After you confirm the database upgrade, start the other Management Servers one at a time by running the this command on each node.

Note

After a successful CloudPlatform upgrade, you will be able to restart Management Server successfully. If the upgrade is not completed successfully, you will face problems in restarting Management Servers

3. Start the Usage Servers that you have stopped (if they were running on your previous version). Perform this on each Usage Server host.

```
# service cloudstack-usage start
```

4. Do the following procedures, if required:

- (KVM Only) Upgrade and start the agent on a KVM host.

  For more information, see *Section 9.7, "Upgrading KVM Agents (KVM Only) "*

- (Hyper-V only) Upgrade and start the agent on a Hyper-V host.

  For more information, see *Section 9.8, "Upgrading Hyper-V Agents (Hyper-V Only) "*

5. Log on to the CloudPlatform UI using administrator privileges and check the status of the hosts.

All hosts must be in the **Up** state (except those hosts that you know to be offline). Depending on the number of hosts, you may need to wait for 20 or 30 minutes to complete this.

Do not proceed to the next step until the hosts display in the **Up** state. If the hosts do not display in the **Up** state, you need to contact Citrix support.

Note

If you cannot log on to CloudPlatform UI, clear your browser cache and reload the page.

6. Upgrade Secondary Storage VMs and Console Proxy VMs.

   For more information, see *Section 9.11, “Upgrading Secondary Storage VMs and Console Proxy VMs ”*

7. Upgrade and restart virtual routers.

   For more information, see *Section 9.12, “Upgrading the Virtual Routers Selectively ”*

8. (XenServer only) Upgrade all existing XenServer clusters to XenServer 6.2 SP1 Hotfix XS62ESP1005.

   For more information, see *Section 9.16.4, “Upgrading to XenServer 6.2 SP1 Hotfix XS62ESP1005”*.

   For instructions for upgrading XenServer software and applying hotfixes, see *Section 9.16.2, “Applying Hotfixes to a XenServer Cluster ”*.

9. (VMware only) After upgrade, you can change a Standard vSwitch zone to a VMware dvSwitch zone, if required.

   For more information, see *Section 9.13, “Changing a Standard vSwitch Zone to a VMware dvSwitch Zone (VMWare Only) ”*

Post-Upgrade Considerations

- Restart the network with setting cleanup to true if DHCP services run concurrently on two VRs.

  Service monitoring is enabled for redundant VR, which causes DHCP services to run simultaneously on two VRs. Stopping service monitoring for the existing routers should resolve this issue.

- Troubleshooting tip: If passwords which you know to be valid appear not to work after upgrade, or other UI issues are seen, try clearing your browser cache and reloading the UI page.

- (VMware only) After upgrade, whenever you add a new VMware cluster to a zone that was created with a previous version of CloudPlatform, the fields vCenter host, vCenter Username, vCenter Password, and vCenter Datacenter are required. The Add Cluster dialog in the CloudPlatform user interface incorrectly shows them as optional, and will allow you to proceed with adding the cluster even though these important fields are blank. If you do not provide the values, you will see an error message like "Your host and/or path is wrong. Make sure it's of the format http://hostname/path".

- We recommend you to use the following global configuration settings:

Global Parameter	Value
deployment.planners.exclude	SkipHeuresticsPlanner
ha.investigators.order	SimpleInvestigator,XenServerInvestigator, KVMInvestigator,HypervInvestigator,

Global Parameter	Value
	VMwareInvestigator,PingInvestigator, ManagementIPSysVMInvestigator
system.vm.random.password	true
xapiwait	60

- If you are using LDAP authentication, change the default values based on the LDAP server that you are using:

LDAP Attribute	OpenLDAP	Active Directory
ldap.user.object	inetOrgPerson	user
ldap.username.attribute	uid	sAMAccountName
ldap.group.object	groupOfUniqueNames	group
ldap.group.user.uniquemember	uniquemember	member

9.2. Upgrading from 4.2.x to 4.5.0

This section explains how to upgrade from CloudPlatform version 4.2.x to version 4.5.

Pre-Upgrade Procedure

1. Register the latest System VM templates.

   For more information about the latest, hypervisor-specific system VM templates, refer to *Appendix A, Latest System VM Templates*

   Note

   CloudPlatform fails to create system VMs if you have provisioned your cloud infrastructure on VMWare hypervisor. This occurs on each zone in your environment that is provisioned on VMWare hypervisor.

   This failure logs the following error message:

   ```
   Message: Unable to unpack snapshot OVA file at: /var/cloudstack/mnt/
   VM/7407677735140.6646923a/template/tmpl/1/8//routing-8.ova
   ```

   To avoid this failure, you must manually run the following command on the templates folder after you register the new VMWare system VM template.

   ```
   chmod -R 0777 /path_to_secondary_storage_mount_point/template/
   ```

2. Download the latest System VM to all the primary storages using the **`prepareTemplate`** API.

   ```
   http://<management_server_ip_address>:8080/client/api?
   command=prepareTemplate&templateid=a8813ba3-dfe8-48b2-a583-0cb19c9423b2&zoneid=ce9a82ba-
   f419-4041-b72b-1d2ee1483ba5&response=json&sessionkey=G8yD3LXsOi1p5KVSkAO62VXM%2BGE%3D
   ```

API response:

```
{ "preparetemplateresponse" : { "count":1 ,"template" : [
{"id":"a8813ba3-dfe8-48b2-a583-0cb19c9423b2","name":"systemvm-
vmware-4.5","displaytext":"systemvm-
vmware-4.5","ispublic":false,"created":"2015-01-06T14:13:19-0800","isready":true,
 "passwordenabled":false,"format":"OVA","isfeatured":false,"crossZones":false,
 "ostypeid":"1a7f544c-95e0-11e4-b6cc-ced18bec4952","ostypename":"Debian
 GNU/Linux 7(64-bit)","account":"admin","zoneid":"ce9a82ba-
f419-4041-b72b-1d2ee1483ba5","zonename":"zone-1","status": "Download
 Complete","size":2621440000,"templatetype":"USER","hypervisor":"VMware","domain":
 "ROOT","domainid":"1a240d26-95e0-11e4-b6cc-
ced18bec4952","isextractable":false,"checksum":"01cb382894c35eab54a0b0d00a884931","tags":
[], "sshkeyenabled":false,"isdynamicallyscalable":false}] } }
```

3. (KVM on RHEL 6.0/6.1/6.2 only) If the existing CloudPlatform deployment includes one or more clusters of KVM hosts that run on RHEL 6.0, RHEL 6.1, or RHEL 6.2 operating system, you must first upgrade the operating system version of these hosts to RHEL 6.3.

   To do this task, see *Section 9.4, “Upgrading Operating System version of KVM Hosts to RHEL 6.3 from RHEL 6.0 or 6.1 ”*

4. Run the following command on all active Usage Server hosts to stop the Usage servers that are currently enabled.

```
# service cloudstack-usage stop
```

5. Run the following command on all Management Servers to stop the Management Server hosts.

```
# service cloudstack-management stop
```

6. Back up MySQL databases at the MySQL master.

   It is assumed in the following procedures that you have set the root password on the MySQL database as per the CCP best practices recommendation. In the following commands, substitute your own MySQL root password.

```
# mysqldump -u root -p<mysql_password> cloud > cloud-backup.dmp
# mysqldump -u root -p<mysql_password> cloud_usage > cloud-usage-backup.dmp
```

Upgrade Procedure

1. Access *https://www.citrix.com/downloads/cloudplatform.html* and download CloudPlatform 4.5 onto the new management server host.

   Note

   You need a valid Citrix account to access this link and download CloudPlatform 4.5.

2. You will get a file with the file name in the format **`CloudPlatform-4.5.0-N-OSVERSION.tar.gz`**. Untar the file and run the **`install.sh`** script that is available with it.

Before you run the following command, you must replace the file and the directory names with the ones that you are using.

```
# tar xzf CloudPlatform-4.5.0-N-OSVERSION.tar.gz
# cd CloudPlatform-4.5.0-N-OSVERSION
# ./install.sh
```

You can see a few messages as the installer prepares, followed by a list of options from which you can choose the option to perform the upgrade operation.

3. Enter **U** to upgrade the package.

```
>U
```

You can view messages as the upgrade proceeds. After the upgrade is completed, you can view the message like **Complete! Done**.

4. If you have made changes to your existing copy of the **db.properties** and the **server.xml** configuration files in your previous-version of CloudPlatform installation, CloudPlatform preserves those changes in the upgrade. However, you need to do the following steps to place these changes in a new version of the file, which is compatible with version 4.5:

   If the upgrade output in the previous step includes a message like the following, it indicates that your old **db.properties** and **server.xml** files contain some custom content and you need to merge the two files:

   For **db.properties** file, the message appears as follows:

```
warning: /etc/cloud.rpmsave/management/db.properties created as /etc/cloudstack/
management/db.properties.rpmnew
```

   For **server.xml** file, the message appears as follows:

```
warning: /etc/cloud.rpmsave/management/server.xml created as /etc/cloudstack/management/
server.xml.rpmnew
```

   a. Backup the previous version of the **db.properties** or the **server.xml** file. For example: (substitute the file name in these commands as needed)

      For the **db.properties** file:

```
# mv /etc/cloudstack/management/db.properties /etc/cloudstack/management/
db.propertiesbackup
```

      For the **server.xml** file:

```
# mv /etc/cloudstack/management/server.xml /etc/cloudstack/management/
server.xmlbackup
```

   b. Copy the ***.rpmsave** file to create a new file.

      For the **db.properties** file:

```
# cp -ap /etc/cloudstack/management/db.properties.rpmsave /etc/cloudstack/management/
db.properties
```

For the **`server.xml`** file:

```
# cp -ap /etc/cloudstack/management/server.xml.rpmsave /etc/cloudstack/management/
server.xml
```

c. Merge your changes from the backup file into the new file.

For the **`db.properties`** file:

```
# vi /etc/cloudstack/management/db.properties
```

For the **`server.xml`** file:

```
# vi /etc/cloudstack/management/server.xml
```

5. Repeat steps 1 - 6 on each management server node.

Post-Upgrade Procedure

1. If you are using VMWare or Hyper-V hypervisors, you must update SystemVM.ISO. *Section 9.15, “Updating SystemVM.ISO ”*

2. Start the first Management Server.

```
# service cloudstack-management start
```

Wait until the databases are upgraded. After you confirm the database upgrade, start the other Management Servers one at a time by running the this command on each node.

Note

After a successful CloudPlatform upgrade, you will be able to restart Management Server successfully. If the upgrade is not completed successfully, you will face problems in restarting Management Servers.

3. Start the Usage Servers that you have stopped (if they were running on your previous version). Perform this on each Usage Server host.

```
# service cloudstack-usage start
```

4. Do the following procedures, if required:

- (KVM Only) Upgrade and start the agent on a KVM host.

  For more information, see *Section 9.7, “Upgrading KVM Agents (KVM Only) ”*

- (Hyper-V only) Upgrade and start the agent on a Hyper-V host.

  For more information, see *Section 9.8, “Upgrading Hyper-V Agents (Hyper-V Only) ”*

5. Log on to the CloudPlatform UI using administrator privileges and check the status of the hosts.

   All hosts must be in the **Up** state (except those hosts that you know to be offline). Depending on the number of hosts, you may need to wait for 20 or 30 minutes to complete this.

   Do not proceed to the next step until the hosts display in the **Up** state. If the hosts do not display in the **Up** state, you need to contact Citrix support.

   Note

   If you cannot log on to CloudPlatform UI, clear your browser cache and reload the page.

6. Upgrade Secondary Storage VMs and Console Proxy VMs.

   For more information, see *Section 9.11, “Upgrading Secondary Storage VMs and Console Proxy VMs ”*

7. Upgrade and restart virtual routers.

   For more information, see *Section 9.12, “Upgrading the Virtual Routers Selectively ”*

8. (XenServer only) Upgrade all existing XenServer clusters to XenServer 6.2 SP1 Hotfix XS62ESP1005.

   For more information, see *Section 9.16.4, “Upgrading to XenServer 6.2 SP1 Hotfix XS62ESP1005”*.

   For instructions for upgrading XenServer software and applying hotfixes, see *Section 9.16.2, “Applying Hotfixes to a XenServer Cluster ”*.

9. (VMware only) After upgrade, you can change a Standard vSwitch zone to a VMware dvSwitch zone, if required.

   For more information, see *Section 9.13, “Changing a Standard vSwitch Zone to a VMware dvSwitch Zone (VMWare Only) ”*

Post-Upgrade Considerations

- Troubleshooting tip: If passwords which you know to be valid appear not to work after upgrade, or other UI issues are seen, try clearing your browser cache and reloading the UI page.
- (VMware only) After upgrade, whenever you add a new VMware cluster to a zone that was created with a previous version of CloudPlatform, the fields vCenter host, vCenter Username, vCenter Password, and vCenter Datacenter are required. The Add Cluster dialog in the CloudPlatform user interface incorrectly shows them as optional, and will allow you to proceed with adding the cluster even though these important fields are blank. If you do not provide the values, you will see an error message like "Your host and/or path is wrong. Make sure it's of the format http://hostname/path".
- We recommend you to use the following global configuration settings:

Global Parameter	Value
deployment.planners.exclude	SkipHeuresticsPlanner
ha.investigators.order	SimpleInvestigator,XenServerInvestigator, KVMInvestigator,HypervInvestigator, VMwareInvestigator,PingInvestigator, ManagementIPSysVMInvestigator
system.vm.random.password	true
xapiwait	60

- If you are using LDAP authentication, change the default values based on the LDAP server that you are using:

LDAP Attribute	OpenLDAP	Active Directory
ldap.user.object	inetOrgPerson	user
ldap.username.attribute	uid	sAMAccountName
ldap.group.object	groupOfUniqueNames	group
ldap.group.user.uniquemember	uniquemember	member

9.3. Upgrading from 3.0.x to 4.5.0

This section explains how to upgrade from CloudPlatform version 3.0.x to version 4.5.

Pre-Upgrade Procedure

1. Register the latest System VM templates.

   For more information about the latest, hypervisor-specific system VM templates, refer to *Appendix A, Latest System VM Templates*

   Note

   CloudPlatform fails to create system VMs if you have provisioned your cloud infrastructure on VMWare hypervisor. This occurs on each zone in your environment that is provisioned on VMWare hypervisor.

   This failure logs the following error message:

   ```
   Message: Unable to unpack snapshot OVA file at: /var/cloudstack/mnt/
   VM/7407677735140.6646923a/template/tmpl/1/8//routing-8.ova
   ```

   To avoid this failure, you must manually run the following command on the templates folder after you register the new VMWare system VM template.

   ```
   chmod -R 0777 /path_to_secondary_storage_mount_point/template/
   ```

2. Download the latest System VM to all the primary storages using the **`prepareTemplate`** API.

```
http://<management_server_ip_address>:8080/client/api?
command=prepareTemplate&templateid=a8813ba3-dfe8-48b2-a583-0cb19c9423b2&zoneid=ce9a82ba-
f419-4041-b72b-1d2ee1483ba5&response=json&sessionkey=G8yD3LXsOi1p5KVSkAO62VXM%2BGE%3D
```

API response:

```
{ "preparetemplateresponse" : { "count":1 ,"template" : [
{"id":"a8813ba3-dfe8-48b2-a583-0cb19c9423b2","name":"systemvm-
vmware-4.5","displaytext":"systemvm-
vmware-4.5","ispublic":false,"created":"2015-01-06T14:13:19-0800","isready":true,
 "passwordenabled":false,"format":"OVA","isfeatured":false,"crossZones":false,
 "ostypeid":"1a7f544c-95e0-11e4-b6cc-ced18bec4952","ostypename":"Debian
 GNU/Linux 7(64-bit)", "account":"admin","zoneid":"ce9a82ba-
f419-4041-b72b-1d2ee1483ba5","zonename":"zone-1","status": "Download
 Complete","size":2621440000,"templatetype":"USER","hypervisor":"VMware","domain":
 "ROOT","domainid":"1a240d26-95e0-11e4-b6cc-
ced18bec4952","isextractable":false,"checksum":
 "01cb382894c35eab54a0b0d00a884931","tags":
[],"sshkeyenabled":false,"isdynamicallyscalable":false}] } }
```

3. (KVM on RHEL 6.0/6.1/6.2 only) If the existing CloudPlatform deployment includes one or more clusters of KVM hosts that run on RHEL 6.0, RHEL 6.1, or RHEL 6.2 operating system, you must first upgrade the operating system version of these hosts to RHEL 6.3.

   To do this task, see *Section 9.4, “Upgrading Operating System version of KVM Hosts to RHEL 6.3 from RHEL 6.0 or 6.1 ”*

4. Run the following command on all active Usage Server hosts to stop the Usage servers that are currently enabled.

   ```
   # service cloudstack-usage stop
   ```

5. Run the following command on all Management Servers to stop the Management Server hosts.

   ```
   # service cloudstack-management stop
   ```

6. Back up MySQL databases at the MySQL master.

   It is assumed in the following procedures that you have set the root password on the MySQL database as per the CCP best practices recommendation. In the following commands, substitute your own MySQL root password.

   ```
   # mysqldump -u root -p<mysql_password> cloud > cloud-backup.dmp
   # mysqldump -u root -p<mysql_password> cloud_usage > cloud-usage-backup.dmp
   ```

Upgrade Procedure

1. (RHEL/CentOS 5.x) If you are currently running CloudPlatform on RHEL/CentOS 5.x, use the following command to set up an Extra Packages for Enterprise Linux (EPEL) repo:

   ```
   rpm -Uvh http://mirror.pnl.gov/epel/5/i386/epel-release-5-4.noarch.rpm
   ```

2. Access *https://www.citrix.com/downloads/cloudplatform.html* and download CloudPlatform 4.5 onto the new management server host.

Note

You need a valid Citrix account to access this link and download CloudPlatform 4.5.

3. You will get a file with the file name in the format **`CloudPlatform-4.5.0-N-OSVERSION.tar.gz`**. Untar the file and run the **`install.sh`** script that is available with it.

   Before you run the following command, you must replace the file and the directory names with the ones that you are using.

   ```
   # tar xzf CloudPlatform-4.5.0-N-OSVERSION.tar.gz
   # cd CloudPlatform-4.5.0-N-OSVERSION
   # ./install.sh
   ```

   You can see a few messages as the installer prepares, followed by a list of options from which you can choose the option to perform the upgrade operation.

4. Enter **`U`** to upgrade the package.

   ```
   >U
   ```

   You can view messages as the upgrade proceeds. After the upgrade is completed, you can view the message like **Complete! Done**.

5. If you have made changes to your existing copy of the **`db.properties`** and the **`server.xml`** configuration files in your previous-version of CloudPlatform installation, CloudPlatform preserves those changes in the upgrade. However, you need to do the following steps to place these changes in a new version of the file, which is compatible with version 4.5:

   If the upgrade output in the previous step includes a message like the following, it indicates that your old **`db.properties`** and **`server.xml`** files contain some custom content and you need to merge the two files:

   For **`db.properties`** file, the message appears as follows:

   ```
   warning: /etc/cloud.rpmsave/management/db.properties created as /etc/cloudstack/
   management/db.properties.rpmnew
   ```

   For **`server.xml`** file, the message appears as follows:

   ```
   warning: /etc/cloud.rpmsave/management/server.xml created as /etc/cloudstack/management/
   server.xml.rpmnew
   ```

   a. Backup the previous version of the **`db.properties`** or the **`server.xml`** file. For example: (substitute the file name in these commands as needed)

      For the **`db.properties`** file:

```
# mv /etc/cloudstack/management/db.properties /etc/cloudstack/management/
db.propertiesbackup
```

For the **`server.xml`** file:

```
# mv /etc/cloudstack/management/server.xml /etc/cloudstack/management/
server.xmlbackup
```

b. Copy the **`*.rpmsave`** file to create a new file.

For the **`db.properties`** file:

```
# cp -ap /etc/cloudstack/management/db.properties.rpmsave /etc/cloudstack/management/
db.properties
```

For the **`server.xml`** file:

```
# cp -ap /etc/cloudstack/management/server.xml.rpmsave /etc/cloudstack/management/
server.xml
```

c. Merge your changes from the backup file into the new file.

For the **`db.properties`** file:

```
# vi /etc/cloudstack/management/db.properties
```

For the **`server.xml`** file:

```
# vi /etc/cloudstack/management/server.xml
```

6. Repeat steps 1 - 6 on each management server node.

Post-Upgrade Procedure

1. Start the first Management Server.

```
# service cloudstack-management start
```

Wait until the databases are upgraded. After you confirm the database upgrade, start the other Management Servers one at a time by running the this command on each node.

Note

After a successful CloudPlatform upgrade, you will be able to restart Management Server successfully. If the upgrade is not completed successfully, you will face problems in restarting M anagement Servers.

2. Start the Usage Servers that you have stopped (if they were running on your previous version). Perform this on each Usage Server host.

```
# service cloudstack-usage start
```

3. Do the following procedures, if required:

   - (KVM Only) Upgrade and start the agent on a KVM host.

     For more information, see *Section 9.7, “Upgrading KVM Agents (KVM Only) ”*

   - (Hyper-V only) Upgrade and start the agent on a Hyper-V host.

     For more information, see *Section 9.8, “Upgrading Hyper-V Agents (Hyper-V Only) ”*

4. Log on to the CloudPlatform UI using administrator privileges and check the status of the hosts.

   All hosts must be in the **Up** state (except those hosts that you know to be offline). Depending on the number of hosts, you may need to wait for 20 or 30 minutes to complete this.

   Do not proceed to the next step until the hosts display in the **Up** state. If the hosts do not display in the **Up** state, you need to contact Citrix support.

   Note

   If you cannot log on to CloudPlatform UI, clear your browser cache and reload the page.

5. Upgrade Secondary Storage VMs and Console Proxy VMs.

   For more information, see *Section 9.11, “Upgrading Secondary Storage VMs and Console Proxy VMs ”*

6. Upgrade and restart virtual routers.

   For more information, see *Section 9.12, “Upgrading the Virtual Routers Selectively ”*

7. If you would like additional confirmation that the new system VM templates were correctly applied when these system VMs were rebooted, SSH into the System VM and check the version.

   Use one of the following techniques, depending on the hypervisor.

   XenServer or KVM:

   SSH in by using the link local IP address of the system VM. For example, in the command below, substitute your own path to the private key used to log in to the system VM and your own link local IP.

   Run the following commands on the XenServer or KVM host on which the system VM is present:

```
# ssh -i /root/.ssh/id_rsa.cloud <link-local-ip> -p 3922
# cat /etc/cloudstack-release
```

   The output should be like the following:

```
Cloudstack Release 4.5.0 Thu Dec 18 18:51:22 UTC 2014
```

ESXi

SSH in using the private IP address of the system VM. For example, in the command below, substitute your own path to the private key used to log in to the system VM and your own private IP.

Run the following commands on the Management Server:

```
# ssh -i /var/cloudstack/management/.ssh/id_rsa <private-ip> -p 3922
# cat /etc/cloudstack-release
```

The output should be like the following:

```
Cloudstack Release 4.5.0 Thu Dec 18 18:51:22 UTC 2014
```

8. If you want to close the admin port again (recommended in production systems), set integration.api.port to null. Then restart the Management Server.

   For information about how to set integration.api.port, see “Setting Configuration Parameters” in the Citrix CloudPlatform Administration Guide.

9. (XenServer only) Upgrade all existing XenServer clusters to XenServer 6.2 SP1 Hotfix XS62ESP1005.

   For more information, see *Section 9.16.4, “Upgrading to XenServer 6.2 SP1 Hotfix XS62ESP1005”*.

   For instructions for upgrading XenServer software and applying hotfixes, see *Section 9.16.2, “Applying Hotfixes to a XenServer Cluster ”*.

10. (VMware only) After upgrade, you can change a Standard vSwitch zone to a VMware dvSwitch zone, if required.

    For more information, see *Section 9.13, “Changing a Standard vSwitch Zone to a VMware dvSwitch Zone (VMWare Only) ”*

Post-Upgrade Considerations

- Troubleshooting tip: If passwords which you know to be valid appear not to work after upgrade, or other UI issues are seen, try clearing your browser cache and reloading the UI page.
- (VMware only) After upgrade, whenever you add a new VMware cluster to a zone that was created with a previous version of CloudPlatform, the fields vCenter host, vCenter Username, vCenter Password, and vCenter Datacenter are required. The Add Cluster dialog in the CloudPlatform user interface incorrectly shows them as optional, and will allow you to proceed with adding the cluster even though these important fields are blank. If you do not provide the values, you will see an error message like "Your host and/or path is wrong. Make sure it's of the format http://hostname/path".
- We recommend you to use the following global configuration settings:

Global Parameter	Value
deployment.planners.exclude	SkipHeuresticsPlanner

Global Parameter	Value
ha.investigators.order	SimpleInvestigator,XenServerInvestigator, KVMInvestigator,HypervInvestigator, VMwareInvestigator,PingInvestigator, ManagementIPSysVMInvestigator
system.vm.random.password	true
xapiwait	60

- If you are using LDAP authentication, change the default values based on the LDAP server that you are using:

LDAP Attribute	OpenLDAP	Active Directory
ldap.user.object	inetOrgPerson	user
ldap.username.attribute	uid	sAMAccountName
ldap.group.object	groupOfUniqueNames	group
ldap.group.user.uniquemember	uniquemember	member

9.4. Upgrading Operating System version of KVM Hosts to RHEL 6.3 from RHEL 6.0 or 6.1

If your existing CloudPlatform deployment includes one or more clusters of KVM hosts that run RHEL 6.0 or RHEL 6.1, you must first upgrade the operating system version on those hosts to RHEL 6.3. You must do this upgrade before you upgrade CloudPlatform.

Run the following commands on every KVM host.

1. Download the CloudPlatform 4.5.0.0 RHEL 6.3 binaries from *https://www.citrix.com/downloads/cloudplatform.html*.

2. Extract the binaries:

```
# cd /root
# tar xvf CloudPlatform-4.5.0.0-rhel6.tar.gz
```

3. Create a CloudPlatform 4.5 qemu repo:

```
# cd CloudPlatform-4.5.0.0-rhel6/6.3
# createrepo
```

4. Prepare the yum repo for upgrade. Edit the file /etc/yum.repos.d/rhel63.repo. For example:

```
[upgrade]
name=rhel63
baseurl=url-of-your-rhel6.3-repo
enabled=1
gpgcheck=0
[cloudstack]
name=cloudstack
baseurl=file:///root/CloudPlatform-4.5.0.0-rhel6/6.3
enabled=1
gpgcheck=0
```

5. Upgrade the host operating system from RHEL 6.0 to 6.3:

```
yum upgrade
```

9.5. Updating the Existing vCenter Password for the VMware Clusters Created in CloudPlatform 3.0.6 (VMware only)

If you have existing clusters created in CloudPlatform 3.0.6, additional steps are required to update the existing vCenter password for each VMware cluster.

These steps will not affect running guests in the cloud. These steps are required only for clouds using VMware clusters:

1. Stop the Management Server:

```
service cloudstack-management stop
```

2. Perform the following on each VMware cluster:

   a. Encrypt the vCenter password:

```
java -classpath /usr/share/cloudstack-common/lib/jasypt-1.9.0.jar
 org.jasypt.intf.cli.JasyptPBEStringEncryptionCLI encrypt.sh
 input=<_your_vCenter_password_> password="`cat /etc/cloudstack/management/key`"
 verbose=false
```

   Save the output from this step for later use. You need to add this in the cluster_details and vmware_data_center tables in place of the existing password.

   b. Find the ID of the cluster from the cluster_details table:

```
mysql -u <username> -p<password>
```

```
select * from cloud.cluster_details;
```

   c. Update the existing password with the encrypted one:

```
update cloud.cluster_details set value = <_ciphertext_from_step_i_> where id =
 <_id_from_step_ii_>;
```

   d. Confirm that the table is updated:

```
select * from cloud.cluster_details;
```

   e. Find the ID of the VMware data center that you want to work with:

```
select * from cloud.vmware_data_center;
```

   f. Change the existing password to the encrypted one:

```
update cloud.vmware_data_center set password = <_ciphertext_from_step_i_> where id =
 <_id_from_step_v_>;
```

g. Confirm that the table is updated:

```
select * from cloud.vmware_data_center;
```

3. Start the CloudPlatform Management server

```
service cloudstack-management start
```

9.6. Upgrading vCenter Server Version 5.1 to Version 5.5

To upgrade VMWare vCenter Server from version 5.1 to version 5.5, perform the following procedure:

1. Run the following command on all the Usage Server hosts to stop the CloudPlatform Usage Servers that are currently running:

```
# service cloudstack-usage stop
```

2. Run the following command on all Management server hosts to stop the CloudPlatform Management Servers:

```
# service cloudstack-management stop
```

3. Upgrade vCenter Server from version 5.1 to 5.5 as described at: *Methods of upgrading to vCenter Server 5.5*[1]

4. Run the following command on each CloudPlatform Management Server separately to start it:

```
#service cloudstack-management start
```

5. Start all CloudPlatform Usage Servers.

```
#service cloudstack-usage start
```

9.7. Upgrading KVM Agents (KVM Only)

The following procedure will not affect the running guests in the cloud. This procedure is required only for clouds using KVM as hosts and only on the KVM hosts.

[1] http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=2053130

Note

After the software upgrade on a KVM machine, the Ctrl+Alt+Del button on the console view of a VM doesn't work. Use Ctrl+Alt+Insert to log in to the console of the VM.

1. Copy the CloudPlatform **`4.5.0.0.tgz`** file, download it to the host, untar it, and change to the resulting directory.
2. Stop the running agent.

```
# service cloudstack-agent stop
```

3. Update the agent software.

```
# ./install.sh
```

4. Choose "U" to update the packages.
5. Upgrade all the existing bridge names to new bridge names by running this script:

```
# cloudstack-agent-upgrade
```

6. Install a libvirt hook with the following commands:

```
# mkdir /etc/libvirt/hooks
# cp /usr/share/cloudstack-agent/lib/libvirtqemuhook /etc/libvirt/hooks/qemu
# chmod +x /etc/libvirt/hooks/qemu
```

7. Restart libvirtd.

```
# service libvirtd restart
```

8. Start the agent.

```
# service cloudstack-agent start
```

9.8. Upgrading Hyper-V Agents (Hyper-V Only)

The following procedure will not affect the running guests in the cloud. This procedure is required only for clouds using Hyper-V as hosts and only on the Hyper-V hosts.

1. Copy the CloudPlatform **`4.5.0.0.tgz`** file, download it to the Hyper-V host, and untar it.
2. Run the **`CloudPlatform-4.5.X-hypervagent.msi`** installer as an Administrator.

   Press the Ctrl + Shift key when you right-click the Agent Installer MSI to run as another user. You can select Administrator from the given options.
3. Provide the Domain user credentials when prompted.

The Domain user is part of the Hyper-V Administrators and local Administrators group on the host. When the agent installation is finished, the agent runs as a service on the host machine.

4. In the **Ready to Update CloudStack Hyper-V Agent Installation** panel, click **Update** to run the Hyper-V agent upgrade process to completion.

To upgrade Hyper-V Agent MSI using command line, run the following command:

```
# msiexec /i CloudStackAgentSetup.msi /quiet /qn /norestart /log install.log
 SERVICE_USERNAME=>username< SERVICE_PASSWORD=>password<INSTALL_CERTIFICATE="False"
```

9.9. Upgrading KVM Host Opearting System

1. Perform the following steps to remove the existing patched qemu binaries and install default qemu binaries:

   a. Stop the running cloudstack agent on the KVM host.

   b.
   ```
   yum clean all
   ```

   c.
   ```
   rpm -e --nodeps qemu-kvm qemu-img
   ```

   d.
   ```
   yum install qemu-kvm qemu-img
   ```

2. Run the **`yum upgrade`**command.

3. Recover **`libvirt`** related configuration files as follows:

   a. Edit **`/etc/sysconfig/libvirtd`**. Ensure that this file has the following two lines at end:

   `export CGROUP_DAEMON='cpu:/virt'`

   `LIBVIRTD_ARGS=-l`

   b. Edit **`/etc/libvirt/qemu.conf`**. Ensure that this file has the following lines at the end:

   `cgroup_controllers=["cpu"]`

   `security_driver="none"`

   `user="root"`

   `group="root"`

   `vnc_listen="0.0.0.0"`

   c. Edit **`/etc/libvirt/libvirtd.conf`**. Ensure that this file has the following lines at the end:

   `listen_tcp=1`

   `tcp_port="16509"`

   `auth_tcp="none"`

```
listen_tls=0
```

4. Restart the **libvirtd** service.

9.10. Upgrading KVM Hosts

If the OS version of the KVM host is RHEL 6.2 and lower, you must upgrade the KVM host OS version to RHEL 6.3 or higher as follows:

Note

Before you upgrade KVM host OS, ensure that Management Server is not upgraded.

1. If the OS version of the KVM host is RHEL 6.2 and lower, you must upgrade the KVM host OS version to RHEL 6.3 or higher:

   a. From the CloudPlatform Management Server UI, place the host in the maintenance mode.

   Note

   Before you upgrade KVM host OS, ensure that Management Server is not upgraded.

   b. Go to the KVM host and upgrade the host OS based on the steps in *Section 9.9, “Upgrading KVM Host Opearting System ”*

   c. Start the cloudstack agent:

   ```
   service cloudstack-agent start
   ```

   d. Cancel the host maintenance. Make sure that the host is in the Up state.

   e. Perform these steps on all the KVM hosts to upgrade their opearting systems to RHEL 6.3 or higher.

2. If OS version of the KVM host is RHEL 6.3 but with older version of CCP installed, the OS upgrade is not mandatory.

   a. Ensure that Management Server is not upgraded. Then, place the host in maintenance mode through CloudPlatform UI.

   b. Decide whether you want to upgrade the version of RHEL. If you want to upgrade, follow the steps in *Section 9.9, “Upgrading KVM Host Opearting System ”*.

   c. Remove the existing patched qemu binaries. see Step 1 in *Section 9.9, “Upgrading KVM Host Opearting System ”*.

   d. Stop and then start the CloudPlatform agent:

```
service cloudstack-agent restart
```

e. Cancel the host maintenance. Ensure that the host is in the Up state.

f. Continue with the above steps on all the KVM hosts.

3. Upgrade Management Server. For more information, refer to the appropriate topic from the following:

   Section 9.1, “Upgrading from 4.3.x to 4.5.0 ”

   Section 9.2, “Upgrading from 4.2.x to 4.5.0 ”

   Section 9.3, “Upgrading from 3.0.x to 4.5.0 ”

4. Upgrade each KVM agent. For more information, refer to *Section 9.7, “Upgrading KVM Agents (KVM Only) ”*

9.11. Upgrading Secondary Storage VMs and Console Proxy VMs

Perform the following on all the System VMs including Secondary Storage VMs and Console Proxy VMs:

1. Upgrade Secondary Storage VMs and Console Proxy VMs either from the UI or by using the following script. To upgrade the system VMs using the script, you must stop and start the system VMs using the **`cloudstack-sysvmadm`** script. Ensure that the value of **`integration.api.port`** is set to 8096. If not, set the value to 8096 and restart Management Server:

   ```
   # cloudstack-sysvmadm -d <IP address> -u cloud -p <password> -s -l <location-log-file>
   ```

   <IP Address> is the IP address of the cloud database server. If you have not specified this, it will display as root. Also, you can specify any location to collect the logs. Default location is **`cloud.log`** under current directory.

9.12. Upgrading the Virtual Routers Selectively

Perform the following procedure to selectively upgrade the virtual routers:

1. Log in to the CloudPlatform UI as the root administrator.
2. In the left navigation, choose Infrastructure.
3. On Virtual Routers, click View More.

   All the VRs are listed in the Virtual Routers page.

4. In Select View drop-down, select desired grouping based on your requirement:

   You can use either of the following:

   - Group by zone
   - Group by pod

- Group by cluster
- Group by account

5. Click the group which has the virtual routers to be upgraded.
6. Click the Upgrade button to upgrade all the virtual routers.

   For example, if you have selected Group by zone, select the name of the desired zone .
7. Click OK to confirm.

9.13. Changing a Standard vSwitch Zone to a VMware dvSwitch Zone (VMWare Only)

After upgrade, if you want to change a Standard vSwitch zone to a VMware dvSwitch Zone, perform the following:

1. Ensure that the Public and Guest traffics are not on the same network as the Management and Storage traffic.
2. Set vmware.use.dvswitch to true.
3. Access the physical network for the Public and guest traffic, then change the traffic labels as given below:

   ```
   <dvSwitch name>,<VLANID>,<Switch Type>
   ```

   For example: dvSwitch18,,vmwaredvs

   VLANID is optional.
4. Stop the Management server.
5. Start the Management server.
6. Add the new VMware dvSwitch-enabled cluster to this zone.

9.14. Upgrade CloudPlatform Bare Metal Agent on PXE and DHCP Servers

If you installed Bare Metal clusters using a previous version of CloudPlatform, use the following steps to upgrade the Bare Metal agent in order to get the latest bug fixes for 4.5.

1. Log in as root to the host or virtual machine running the Bare Metal PXE server and DHCP server.
2. Download CloudPlatform 4.5.0.0 onto the PXE or DHCP server. Get the software from the following link:

   https://www.citrix.com/English/ss/downloads/.

Note

You need a valid Citrix account to access this link and download CloudPlatform 4.5.

3. Upgrade the CloudPlatform packages. You should have a file in the form of “CloudPlatform-4.5.0-N-OSVERSION.tar.gz”. Untar the file, then run the install.sh script inside it. Replace the file and directory names below with those you are using:

```
# tar xzf CloudPlatform-4.5.0-N-OSVERSION.tar.gz
# cd CloudPlatform-4.5.0-N-OSVERSION
# ./install.sh
```

   You should see a few messages as the installer prepares, followed by a list of choices.

4. Choose "U" to upgrade the package

```
>U
```

   You should see some output as the upgrade proceeds, ending with a message like "Complete! Done."

5. Run the Bare Metal setup script:

```
cloudstack-setup-baremetal
```

9.15. Updating SystemVM.ISO

Note

You must perform this procedure if you are provisioning your cloud infrastructure on Hyper-V.

Normally, you do not perform this procedure if you are upgrading CloudPlatform with other supported hypervisors. However, if you are applying a hotfix to update systemVMs, you must perform this procedure.

Note

On CloudPlatform versions 3.0.5.x and 3.0.7.x **`systemvm.iso`** will get propagated automatically; therefore, no separate procedure is required.

Perform the following based on the hypervisor that you use:

- XenServer: No action is required.
- KVM
  a. On the KVM host, stop the CloudPlatform agent.
  b. Upgrade the CloudPlatform agent.
  c. Restart the CloudPlatform agent.
  d. Stop and Start SystemVMs.
- Hyper-V (for CloudPlatform versions 4.3 and above)
  a. Stop all the Management Servers.
  b. Remove **`systemvm-4.3.x.x.iso`** from the **`systemvm`** directory in the Secondary Storage directory, **`\\<secondary_storage_path>\systemvm\`**.
  c. Remove **`systemvm-4.3.x.x.iso`** from each Hyper-V host.

     The location of the file is **`C:\Users\Public\Documents\Hyper-V\Virtual Hard Disks`**.
  d. Start the Management Server.
  e. Destroy SystemVMs.

     New SystemVMs will be spawned and the new iso, **`systemvm-4.3.x.x.iso`**, is copied to the secondary storage and Hypervisor host.
- VMware
  a. Stop all the Management Servers.
  b. Remove the old **`systemvm<version>.iso`** file from the **`systemvm`** directory, **`\ \<secondary_storage_path>\systemvm\`**.

     Where <version> denotes the Management Server version number.
  c. Start the Management Server.

     Verify if the new **`systemvm.iso`** is pushed to the **`systemvm`** folder in the Secondary Storage directory.
  d. Stop and Start SystemVMs.

9.16. Upgrading and Applying Hotfix on XenServer Hypervisor Hosts

In CloudPlatform 4.5.0, you can upgrade XenServer hypervisor host software without having to disconnect the XenServer cluster. You can upgrade XenServer 5.6 GA, or 5.6 FP1 to any newer version that is supported by CloudPlatform. The actual upgrade is described in XenServer documentation, but there are some additional steps you must perform before and after the upgrade.

9.16.1. Upgrading to a New XenServer Version

To upgrade XenServer hosts when running CloudPlatform 4.5.0.0:

1. Edit the file /etc/cloudstack/management/environment.properties and add the following line:

```
manage.xenserver.pool.master=false
```

2. Restart the Management Server to put the new setting into effect.

```
# service cloudstack-management restart
```

3. Find the host name of the master host in your XenServer cluster (pool):

   a. Run the following command on any host in the pool, and make a note of the host-uuid of the master host:

   ```
   # xe pool-list
   ```

   b. Now run the following command, and find the host that has a host-uuid that matches the master host from the previous step. Make a note of this host's name. You will need to input it in a later step.

   ```
   # xe host-list
   ```

4. On CloudPlatform, put the master host into maintenance mode. Use the host name you discovered in the previous step.

Note

In the latest XenServer upgrade procedure, even after putting the master host into maintenance mode, the master host continues to stay as master.

   Any VMs running on this master will be automatically migrated to other hosts, unless there is only one UP host in the cluster. If there is only one UP host, putting the host into maintenance mode will stop any VMs running on the host.

5. Disconnect the XenServer cluster from CloudPlatform. It will remain disconnected only long enough to upgrade one host.

   a. Log in to the CloudPlatform UI as root.

   b. Navigate to the XenServer cluster, and click Actions – Unmanage.

   c. Watch the cluster status until it shows Unmanaged.

6. Upgrade the XenServer software on the master host:

   a. Insert the XenServer CD.

   b. Reboot the host.

   c. Upgrade to the newer version of XenServer. Use the steps in XenServer documentation.

7. Cancel the maintenance mode on the master host.
8. Reconnect the XenServer cluster to CloudPlatform.
    a. Log in to the CloudPlatform UI as root.
    b. Navigate to the XenServer cluster, and click Actions – Manage.
    c. Watch the status to see that all the hosts come up.
9. Upgrade the slave hosts in the cluster:
    a. Put a slave host into maintenance mode.

        Wait until all the VMs are migrated to other hosts.
    b. Upgrade the XenServer software on the slave.
    c. Cancel maintenance mode for the slave.
    d. Repeat steps *a* through *c* for each slave host in the XenServer pool.
10. You might need to change the OS type settings for VMs running on the upgraded hosts, if any of the following apply:
    - If you upgraded from XenServer 5.6 GA to XenServer 5.6 SP2, change any VMs that have the OS type CentOS 5.5 (32-bit), Oracle Enterprise Linux 5.5 (32-bit), or Red Hat Enterprise Linux 5.5 (32-bit) to Other Linux (32-bit). Change any VMs that have the 64-bit versions of these same OS types to Other Linux (64-bit).
    - If you upgraded from XenServer 5.6 SP2 to XenServer 6.0.2 or higher, change any VMs that have the OS type CentOS 5.6 (32-bit), CentOS 5.7 (32-bit), Oracle Enterprise Linux 5.6 (32-bit), Oracle Enterprise Linux 5.7 (32-bit), Red Hat Enterprise Linux 5.6 (32-bit) , or Red Hat Enterprise Linux 5.7 (32-bit) to Other Linux (32-bit). Change any VMs that have the 64-bit versions of these same OS types to Other Linux (64-bit).
    - If you upgraded from XenServer 5.6 to XenServer 6.0.2 or higher, do all of the above.

9.16.2. Applying Hotfixes to a XenServer Cluster

1. Edit the file /etc/cloudstack/management/environment.properties and add the following line:

```
manage.xenserver.pool.master=false
```

2. Restart the Management Server to put the new setting into effect.

```
# service cloudstack-management restart
```

3. Find the host name of the master host in your XenServer cluster (pool):
    a. Run the following command on any host in the pool, and make a note of the host-uuid of the master host:

```
# xe pool-list
```

b. Now run the following command, and find the host that has a host-uuid that matches the master host from the previous step. Make a note of this host's name. You will need to input it in a later step.

```
# xe host-list
```

4. On CloudPlatform, put the master host into maintenance mode. Use the host name you discovered in the previous step.

   Any VMs running on this master will be automatically migrated to other hosts, unless there is only one UP host in the cluster. If there is only one UP host, putting the host into maintenance mode will stop any VMs running on the host.

5. Disconnect the XenServer cluster from CloudPlatform. It will remain disconnected only long enough to hotfix one host.

   a. Log on to the CloudPlatform UI as root.

   b. Navigate to the XenServer cluster, and click Actions – Unmanage.

   c. Watch the cluster status until it shows Unmanaged.

   d. If pool HA is enabled , disable pool HA.

6. Hotfix the master host:

   a. Add the XenServer hot fixes to the master host.

      i. Assign a UUID to the update file:

      ```
      xe patch-upload file-name=XS602E015.xsupdate
      ```

      The command displays the UUID of the update file:

      ```
      33af688e-d18c-493d-922b-ec51ea23cfe9
      ```

      ii. Repeat the xe patch-upload command for all other XenServer updates: XS62ESP1005.xsupdate, XS62ESP1003.xsupdate.

      Take a note of the UUIDs of the update files. The UUIDs are required in the next step.

   b. Apply XenServer hot fixes to master host:

   ```
   xe patch-apply host-uuid=<master uuid> uuid=<hotfix uuid>
   ```

   c. Repeat xe patch-apply command for all the hot fixes.

   d. Install the required CSP files.

   ```
   xe-install-supplemental-pack <csp-iso-file>
   ```

   e. Restart the master host.

7. Cancel the maintenance mode on the master host.

8. Reconnect the XenServer cluster to CloudPlatform.
   a. Log on to the CloudPlatform UI as root.
   b. Navigate to the XenServer cluster, and click Actions – Manage.
   c. Watch the status to see that all the hosts come up.
9. Hotfix the slave hosts in the cluster:
   a. Put a slave host into maintenance mode.

      Wait until all the VMs are migrated to other hosts.
   b. Apply the XenServer hot fixes to the slave host:

      ```
      xe patch-apply host-uuid=<slave uuid> uuid=<hotfix uuid>
      ```
   c. Repeat Step a through b for each slave host in the XenServer pool.
   d. Install the required CSP files.

      ```
      xe-install-supplemental-pack <csp-iso-file>
      ```
   e. Restart the slave hosts.

      Wait until all the slave hosts are up. It might take several minutes for the hosts to come up.
10. Cancel the maintenance mode on the slave hosts.
11. Put the master host to maintenance and unmanage the cluster.
12. If pool HA was disabled (in step3), enable pool HA by providing the heartbeat Storage Repository:

    ```
    # xe pool-ha-enable heartbeat-sr-uuids="uuid of the HA SR"
    ```

    Note

    When you re-enable pool HA, ensure that you use **`xe pool-ha-enable`** with the *`heartbeat-sr-uuids`* parameter pointing to the correct HA Storage Repository. If the *`heartbeat-sr-uuids`* parameter is skipped, any Storage Repository is randomly picked up for HA, which should be avoided.

13. You might need to change the OS type settings for VMs running on the upgraded hosts, if any of the following apply:
    - If you upgraded from XenServer 5.6 SP2 to XenServer 6.0.2, change any VMs that have the OS type CentOS 5.6 (32-bit), CentOS 5.7 (32-bit), Oracle Enterprise Linux 5.6 (32-bit), Oracle Enterprise Linux 5.7 (32-bit), Red Hat Enterprise Linux 5.6 (32-bit) , or Red Hat Enterprise Linux 5.7 (32-bit) to Other Linux (32-bit). Change any VMs that have the 64-bit versions of these same OS types to Other Linux (64-bit).

- If you upgraded from XenServer 5.6 GA or 5.6 FP1 to XenServer 6.0.2, change any VMs that have the OS type CentOS 5.5 (32-bit), CentOS 5.6 (32-bit), CentOS 5.7 (32-bit), Oracle Enterprise Linux 5.5 (32-bit), Oracle Enterprise Linux 5.6 (32-bit), Oracle Enterprise Linux 5.7 (32-bit), Red Hat Enterprise Linux 5.5 (32-bit), Red Hat Enterprise Linux 5.6 (32-bit) , or Red Hat Enterprise Linux 5.7 (32-bit) to Other Linux (32-bit). Change any VMs that have the 64-bit versions of these same OS types to Other Linux (64-bit).

9.16.3. Installing CloudPlatform XenServer Support Package (CSP)

Ensure that you install CloudPlatform XenServer Support Package (CSP) to enable security groups, elastic load balancing, and elastic IP on XenServer.

If your hosts on versions prior to 6.2 operated on bridge mode with CSP packages installed, after upgrade, run only the following to restore the desired Security Groups configuration:

1. If the XenServer host is part of a zone that uses basic networking, disable Open vSwitch (OVS):

```
# xe-switch-network-backend bridge
```

2. Restart the host machine when prompted.
3. If you are using XenServer 6.1 or higher, perform the following:
   a. Run the following commands:

```
echo 1 > /proc/sys/net/bridge/bridge-nf-call-iptables
echo 1 > /proc/sys/net/bridge/bridge-nf-call-arptables
```

   b. To persist the above changes across reboots, set the following values in the /etc/sysctl.conf file. Run the following command:

```
sysctl -p /etc/sysctl.conf
```

   Set these to 1:

```
net.bridge.bridge-nf-call-iptables = 1
net.bridge.bridge-nf-call-arptables = 1
```

9.16.4. Upgrading to XenServer 6.2 SP1 Hotfix XS62ESP1005

It is highly recommended that all XenServer clusters are upgraded to XenServer 6.2 SP1 Hotfix XS62ESP1005. You can upgrade from any prior version of XenServer to the latest version, which might include multiple hops as part of a single upgrade process. For example, if you are upgrading from 6.0.2, upgrade the master host by using the upgrade path given below, followed by each slave host upgrading to XenServer 6.2 SP1 Hotfix XS62ESP1005 by using this same upgrade path:

1. XenServer 6.0.2 to XenServer 6.2
2. XenServer 6.2 to XenServer 6.2 SP1
3. XenServer 6.2 SP1 to XenServer 6.2 SP1 Hotfix XS62ESP1005

After upgrading, ensure that XenServer Pool HA is enabled.

9.17. Upgrading from Apache CloudStack to CloudPlatform

You can upgrade from Apache CloudStack 4.5 to CloudPlatform 4.5. The procedure that you need to follow for this upgrade is similar to the procedure for upgrading from the previous versions of CloudPlatform to CloudPlatform 4.5.

The following sections in this guide describe the procedure that you must follow to upgrade from the previous versions of CloudPlatform to CloudPlatform 4.5:

- *Section 9.1, “Upgrading from 4.3.x to 4.5.0 ”*
- *Section 9.2, “Upgrading from 4.2.x to 4.5.0 ”*
- *Section 9.3, “Upgrading from 3.0.x to 4.5.0 ”*

Appendix A. Latest System VM Templates

To register the system VM template, do the following:

1. Log on to the CloudPlatform UI as root administrator.
2. In the CloudPlatform UI, add a new System VM template for each hypervisor type that is used in your cloud. In the left-side navigation bar, click **Templates**.

   Note

   In each zone, add a system VM template for the hypervisor that is used in that zone. Citrix strongly recommends using the same type of hypervisors in a zone to avoid operational issues.

3. In the right-side pane, in the **Select view** list box, select **Templates** and click **Register template**.
4. In the **Register template** dialog box, specify the values depending on the hypervisor type and click **OK**.

   For more information about the latest, hypervisor-specific system VM templates, refer to the following table:

   Ensure that the template downloads successfully and enters the READY state. Proceed after the templates are downloaded successfully.

   Note

   If you use more than one type of hypervisors in your cloud, repeat these steps to download the system VM template for each hypervisor type. If you do not repeat the steps for each hypervisor type, the upgrade will fail.

The following table displays the System VM templates available with the CloudPlatform version 4.5:

Hypervisor	Description
XenServer	Name: systemvm-xenserver-4.5 Description: systemvm-xenserver-4.5 URL: *http://download.cloud.com/templates/4.5/systemvm64template-2014-12-18-4.5.0.0-xen.vhd.bz2* Zone: (4.3 and beyond) Choose the zone where this hypervisor is used. If your CloudPlatform

Hypervisor	Description
	deployment includes multiple zones running XenServer, select each zone and individually register the template to make the template available in all the XenServer zones. (Prior to version 4.3): Choose the zone where this hypervisor is used. If your CloudPlatform deployment includes multiple zones running XenServer, choose **All Zones** to make the template available in all the zones. Hypervisor: XenServer Format: VHD OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown) Extractable: no Password Enabled: no Public: no Featured: no *Section 9.1, “Upgrading from 4.3.x to 4.5.0 ”* *Section 9.2, “Upgrading from 4.2.x to 4.5.0 ”* *Section 9.3, “Upgrading from 3.0.x to 4.5.0 ”*
KVM	Name: systemvm-kvm-4.5 Description: systemvm-kvm-4.5 URL: *http://download.cloud.com/templates/4.5/systemvm64template-2014-12-18-4.5.0.0-kvm.qcow2.bz2* Zone: (4.3 and beyond) Choose the zone where this hypervisor is used. If your CloudPlatform deployment includes multiple zones running KVM, select each zone and individually register the template to make the template available in all the zones. (Prior to version 4.3): Choose the zone where this hypervisor is used. If your CloudPlatform deployment includes multiple zones running KVM, choose **All Zones** to make the template available in all the zones. Hypervisor: KVM Format: QCOW2

Hypervisor	Description
	OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown) Extractable: no Password Enabled: no Public: no Featured: no *Section 9.1, “Upgrading from 4.3.x to 4.5.0 ”* *Section 9.2, “Upgrading from 4.2.x to 4.5.0 ”* *Section 9.3, “Upgrading from 3.0.x to 4.5.0 ”*
VMware	Name: systemvm-vmware-4.5 Description: systemvm-vmware-4.5 URL: *http://download.cloud.com/templates/4.5/systemvm64template-2014-12-18-4.5.0.0-vmware.ova* Zone: Zone: (4.3 and beyond) Choose the zone where this hypervisor is used. If your CloudPlatform deployment includes multiple zones running VMware hypervisor, select each zone and individually register the template to make the template available in all the zones. (Prior to version 4.3): Choose the zone where this hypervisor is used. If your CloudPlatform deployment includes multiple zones running VMware hypervisor, choose **All Zones** to make the template available in all the zones. Hypervisor: VMware Format: OVA OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown) Extractable: no Password Enabled: no Public: no Featured: no *Section 9.1, “Upgrading from 4.3.x to 4.5.0 ”*

Hypervisor	Description
	Section 9.2, “Upgrading from 4.2.x to 4.5.0 ” *Section 9.3, “Upgrading from 3.0.x to 4.5.0 ”*
Hyper-V (Applies to versions 4.3 and above)	Name: systemvm-hyperv-4.5 Description: systemvm-hyperv-4.5 URL: *http://download.cloud.com/templates/4.5/systemvm64template-2014-12-18-4.5.0.0-hyperv.vhd.bz2* Zone: Choose the zone where this hypervisor is used. If your CloudPlatform deployment includes multiple zones running Hyper-V, choose All Zones to make the template available in all the Hyper-V zones. Hypervisor: Hyper-V Format: VHD OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown) Extractable: no Password Enabled: no Public: no Featured: no *Section 9.1, “Upgrading from 4.3.x to 4.5.0 ”* *Section 9.2, “Upgrading from 4.2.x to 4.5.0 ”* *Section 9.3, “Upgrading from 3.0.x to 4.5.0 ”*

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